

REMARKS

Applicant is in receipt of the Advisory Action mailed December 1, 2009.

Claims 1, 7, 9-10, 13, 15-21, 23-25, 27-31, 42, 45 and 48-53 were pending in the application prior to Applicant's submission of November 6, 2009 in response to the final office action. In that submission, Applicant amended claims 49, 51 and 52 and canceled claim 31. However, in a telephone conversation with Applicant's Agent (Mark Brightwell), the Examiner indicated that those amendments were not entered into the record. Thus, the amendments presented now are made relative to the claims as they stood prior to the November 6, 2009 submission. Please ignore the amendments made in the November 6, 2009 submission.

Claims 15, 25, 29 and 31 are herein canceled. Claims 1, 10, 13, 16-21, 27, 42, 48-49 and 51-52 are herein amended. Claims 54-56 are herein added. Thus, claims 1, 7, 9-10, 13, 16-21, 23-24, 27-28, 30, 42, 45 and 48-56 will be pending in the application after entry of the present amendment.

Claim Objections

In the 8/03/2009 Final Action, the Examiner objected to claims 51 and 52 for depending on a canceled claim (i.e., on claim 3). Claims 51 and 52 have each been amended to correct their statement of dependency

Art-Based Rejections

The pending claims were rejected under 35 U.S.C. 103(a) as being unpatentable in view of various combinations of:

Gorell et al. ("Trends in Reservoir Simulation: Big Models, Scalable Models? Will You Please Make Up Your Mind")

Netemeyer et al. (U.S. Pub. No. 2002/0169785);

Voit et al. ("Random Number Generation from Right-Skewed, Symmetric, and Left-Skewed Distributions", Risk Analysis, Vol. 20, No. 1, 2000);

Jalali et al. (U.S. Pub. No. 2002/0177955 A1);

Begg et al. (“Improving Investment Decisions Using a Stochastic Integrated Asset Model, SPE 71414, SPE Annual Technical Conference and Exhibition, 9/2001);

Egyed (“A Scenario-Driven Approach to Traceability”, IEEE, 2001);

Joshi et al. (Techno-Economic and Risk Evaluation of a Thermal Recovery Project, March 1996, Prepared for Department of Energy).

In particular, claims 1, 13, 15-16, 49 and 51-52 were rejected based on Gorell in view of Netemeyer. Claims 7 and 9 were rejected based on Gorell in view of Netemeyer and Voit. Claim 10 was rejected based on Gorell in view of Netemeyer and Voit. Claims 17-21, 25 and 27-30 were rejected based on Gorell in view of Netemeyer and Jalali. Claim 23 was rejected based on Gorell in view of Netemeyer, Jalali and Begg. Claim 24 was rejected based on Gorell in view of Netemeyer, Jalali and Voit. Claim 31 was rejected based on Gorell and Egyed. Claims 42, 45 and 48 were rejected based on Gorell in view of Netemeyer, Jalali and Begg. Claims 50 and 53 were rejected based on Gorell in view of Netemeyer and Joshi. Applicant respectfully traverses these rejections based on the following reasoning.

Claim 1, as herein amended, explicitly recites the following combination of features:

“executing the simulation engines on the workflow, wherein the simulation engines include one or more physics-based flow simulators for simulating reservoirs, wells and surface-pipeline hydraulics, wherein the simulation engines also include an economic computation engine”; and

“repeatedly performing a set of operations including said selecting, said assembling the instantiated models, said executing and said storing”.

Thus, the claimed method requires that the “one or more physics-based flow simulators” be executed each time the “economic computation engine” is executed. Gorell teaches the opposite. In particular, Gorell teaches:

Economic simulation utilizes 100’s to 1000’s of Monte Carlo iterations to estimate the uncertainties in the business value of an asset. Each iteration requires the production profile that corresponds to the sampled parameters controlling hydrocarbon recovery. Running a reservoir simulation for each iteration **is not practical** so equations are used as a surrogate for the

simulator.”¹ (*Emphasis added.*)

Thus, Gorell specifically advises against running a “reservoir simulation” for each iteration of an “economic simulation”. Instead, Gorell teaches running a set of iterations of a reservoir simulator; using the results of those iterations to generate “coefficients” (r_0 , r_1 , r_2 , ...) for an equation that characterizes the response behavior of the reservoir simulator; and then running a separate set of iterations of the economic simulation based on the equation. See Gorell page 10, right column, especially, the equation that expresses “Response” as a function of the uncertainty parameters (a_q , f_t , ...) associated with the reservoir simulator. Each iteration of Gorell’s reservoir simulator uses a different set of values for the uncertainty parameters and produces a separate production profile. As shown in Gorell Figure 17, the production profile has characteristic properties of “plateau length”, “rate decline” and “recoverable hydrocarbon amount”. Gorell teaches performing a “least squares regression” to estimate the parameters r_0 , r_1 , r_2 , ... that give the best fit between response variables (such as plateau length) and the uncertainty parameter data used in the reservoir simulator iterations. (*See the eight lines immediately after the response equation.*) The “equations” based on the estimated parameters are then “used as a **surrogate** for the [reservoir] simulator” when performing iterations of the “economic simulation”. (*See Gorell page 10, left columns, first through fifth bullet points. See also Gorell page 10, the sentence that bridges between the left and right columns.*) Thus, Gorell advises against executing “one or more physics-based flow simulators” each time the “economic computation engine” is executed, as claimed. Thus, the Examiner’s arguments based on Gorell collapse.

Claim 1 and its dependents are believed to be patentably distinct over the cited references at least for the reason given above. Claims 10, 13, 17, 19, 21, 42 and 48 each recite features similar to those recited above with respect to claim 1. Thus, these claims and their dependents are believed to be patentably distinguished over the cited references based at least on reasoning similar to that given above.

¹ See Gorell page 10, left column, last paragraph.

CONCLUSION

In light of the foregoing amendments and remarks, Applicant submits the application is now in condition for allowance, and an early notice to that effect is requested.

If any extensions of time (under 37 C.F.R. § 1.136) are necessary to prevent the above-referenced application(s) from becoming abandoned, Applicant(s) hereby petition for such extensions. The Commissioner is hereby authorized to charge any fees which may be required or credit any overpayment to Meyertons, Hood, Kivlin, Kowert & Goetzel P.C., Deposit Account No. 50-1505/5460-01101/JCH.

Also filed herewith are the following items:

- ☒ Request for Continued Examination
- ☐ Terminal Disclaimer
- ☐ Notice of Change of Address
- ☐ Other:

Respectfully submitted,

/Jeffrey C. Hood/

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